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ABSTRACT

Integration of vocational and academic education at the secondary level has been suggested as a way to strengthen students' education. Concerns about the vocational-academic split found in high schools center around human rights issues; economic competitiveness dependent on strengthened education; and graduates unprepared for life, work, or college. Curriculum theorists discuss three ways to organize a subject curriculum (correlated curriculum, fused curriculum, and broad fields curriculum) and two alternatives to the subject curriculum (core curriculum and activity curriculum). The literature indicates considerable activity directed toward integrating vocational and academic education. The most frequent type is the emphasis on basic academic skills in vocational courses. Three dimensions of the method for accomplishing the integration have been identified: content blend, teacher arrangement, and program of study. The scope of curriculum integration can be thought of in terms of breadth of exposure and exposure time. Motives for integration are the needs of society, teachers, students, and administration. Issues that require study are what should be integrated, who should benefit, what the desired outcome is, and how efforts should be evaluated. Three possible scenarios illustrate the potential breadth and depth of vocational and academic integration: vocational roles, vocational methods, and unabashed vocational emphasis. (Appendixes include 275 references for the paper, tables, and related literature and 2 integration models.) (YLB)

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INTEGRATION OF VOCATIONAL AND ACADEMIC EDUCATION: THEORY AND PRACTICE

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INTRODUCTION

Vocational education and academic education generally are viewed as separate areas of knowledge and skills. Not only are they viewed as separate, but they are also often considered incompatible. In recent discussions of ways to improve the quality of U.S. education, some have suggested that academic or general aspects of education ought to be integrated with vocational education content. Underlying such suggestions are the notions that there are parts of the curriculum that can be related to one another and that the related parts will make a complex and harmonious whole. The assumption is made that students' education will be strengthened if there are less fragmentation in their curriculum and more explicit linking of content that has been considered vocational and that which is usually thought of as academic.

We know that integration can and does occur within disciplinary areas. When this vertical integration or articulation is desired, curriculum is organized so that students learn to relate concepts, find connections between previous experiences and current learning, formulate generalizations and principles, build theories, and in other ways develop unifying understanding and skills within a given discipline or subject area, usually over a period of time.

Rather than referring to integration within a discipline, current discussions of curriculum integration more commonly refer to integration of two or more subject areas. In this paper, theoretical approaches to horizontal integration of vocational and academic school subjects will be discussed, and a review of literature that reports on actual attempts to integrate vocational and academic education will be presented. At the end of the paper, we discuss some issues surrounding the integration of vocational and academic education and we present some scenarios for integration that go beyond contemporary practice. These issues and scenarios suggest that the integration of vocational and academic education will require changes in the organization of schools, in the use of instructional methods, and in perceptions of vocational education.

It should be noted that this paper focuses on integration of vocational and academic education at the secondary level rather than the elementary or postsecondary level.

BACKGROUND TO THE CURRENT CONCERN FOR INTEGRATION

Before discussing either theoretical or actual approaches to integrating curriculum, it will be helpful to clarify meanings of terms used in this paper, examine both the origins and current concern about the separation of vocational and academic education in the secondary school, and introduce the idea of integrating subject matter areas as one approach to improving curriculum.

Meanings of Terms

Our study of the integration of vocational and academic education began with efforts to make sense of concepts and language central to the topic. The terms "vocational" and "academic" are each used with a variety of meanings by different people. Further, when trying to make sense of these terms, one encounters related terms such as "general education," "liberal education," "common curriculum," "balanced curriculum," "interdisciplinary curriculum," "specialization," "basic education," "basic schooling," "general curriculum," and "common schooling." To add to the semantic confusion, sometimes the meaning of these words shifts, depending on the level of education—elementary, secondary, or postsecondary—being discussed.

It is beyond the scope of this paper to develop an original analysis and full conceptualization of these terms. What we will do—so that we can discuss the issue of how to integrate vocational and academic education—is provide definitions for key concepts that are central to our discussion: curriculum integration, vocational education, academic education, liberal education, and general education.

Curriculum Integration

Curriculum integration refers to the process of uniting parts or elements of a student's educational experience to form a more inclusive whole. Horizontal curriculum integration occurs when parts of a student's learning are integrated at one level of her or his experience—for example, curriculum planning that enables a student to understand principles learned in a tenth grade physics course by applying those principles in a tenth grade industrial technology course. Vertical curriculum integration is the purposeful

connecting of parts of a student's experience from one level to another—for example, the explicit plan to relate concepts learned in a tenth grade business course with those learned in an eleventh grade business course. Vertical integration can occur within one disciplinary area, or it can be planned to more comprehensively relate several disciplinary areas from one level to another.

Vocational Education

Traditionally, "vocational" is used to refer to education that prepares people for gainful occupations (Prosser & Quigley, 1949). Variations on this definition refer to education for gainful occupations and utilitarian labor—including homemaking (Good, 1973), education that prepares people for work (Roberts, 1965), or education that prepares people for work and family roles (Copa et al., 1985). Another approach to defining vocational education is to specify the types of skills, attitudes, and understandings that help students develop. Recently, the National Commission on Secondary Vocational Education stated that vocational education should be concerned with the development of students in the following five areas: "(1) personal skills and attitudes, (2) communication and computational skills and technological literacy, (3) employability skills, (4) broad and specific occupational skills and knowledge, and (5) foundations for career planning and lifelong learning" (The National Commission on Secondary Vocational Education, 1984, p. 3). Vocational education is usually offered to students via courses in the following nine subject areas or subfields: agriculture, business, consumer home economics, industrial arts, marketing, occupational health, occupational home economics, technology, and trades and industry (T & I).

Academic Education

"Academic" is used to refer to education organized around generally accepted disciplines. Although these disciplines are defined in various ways, at the secondary school level they are usually limited to the knowledge areas of English, foreign languages, history, economics, mathematics, and science (Good, 1973). Traditionally, all secondary school students have been required to take a certain number of courses in each academic area in order to graduate. Students planning to attend college usually take more than the minimum number of academic courses required so that they can meet college entrance requirements and expectations.

The distinctions between vocational and academic curriculum content are often imprecise, a fact that seems somewhat surprising when one remembers that the two kinds of education are considered so different from one another and when one considers how students are likely to use what they learn.

> Courses that are labeled "academic" can provide vocational preparation for students who will work in many fields. For example, instruction in speaking and writing, usually labeled "academic," is clearly vocational in nature for the prospective lawyer or teacher. At the same time, instruction in plant physiology or cell biology may be considered vocational for the prospective greenhouse operator or farmer. (National Commission on Secondary Vocational Education, 1984, p. 13)

There is a little-understood aspect of the secondary vocational curriculum which further blurs the distinctions among "vocational," "general," and "academic" education: several of the major secondary vocational subfields reflect a strong historical and philosophical division between occupations-focused education and general vocational education. In industrial education, for example, there are at least three separate secondary subfields—trades and industry (T & I) education, industrial arts education, and technology education. A student enrolled in T & I would be prepared for employment in a specific trade, whereas a student enrolled in industrial arts would study the history and processes of industrialization and learn industrial skills supposedly transferable to a broad range of industrial occupations. A student enrolled in technology education could expect to learn about resources such as people, knowledge, materials, energy, capital, and finance that comprise natural and human-made environments and systems such as thermal, fluid, mechanical, and electrical systems (Hales & Snyder 1982a, 1982b; Snyder & Hales, 1981). Similarly, within home economics both consumer and occupational home economics appear in the secondary curriculum; and although the subfield of agricultural education has just one name, there is, in fact, a distinction between courses with a strict occupational emphasis and those with a general emphasis.

Liberal Education

Although "liberal education" and "general education" are sometimes used as synonyms for "academic education," these terms have somewhat different meanings. Liberal education is usually thought of as preparation for living rather than preparation for earning a living, as education which has intrinsic rather than extrinsic worth, as education not intended to be applied but to be appreciated. Originally, liberal education was intended

for the aristocratic elite who pursued such studies at leisure. Seven liberal arts comprised the medieval curriculum: grammar, rhetoric, logic or dialectic, arithmetic, geometry, astronomy, and music. "Liberal education" and "liberal arts" are terms more frequently used to describe college level education than other levels of education. At the college level, some subject areas, such as mathematics and science, are variously labeled "academic" and "liberal." Their categorization seems to depend on their intended use—studies that have intrinsically worthwhile ends versus studies that have extrinsic utility.

General Education

General education grew out of a concern that college and university educations were becoming overly specialized; that the curriculum was fragmented and chaotic; and that liberal education had become technical, narrow, and irrelevant to human concerns (McConnell, 1952). As a result of that concern, general education was proposed as a means for preparing "youth to deal with the personal and social problems with which all men in a democratic society are confronted" (Faust, 1950, p. 6). It attempts "to provide a particular group of students with a common core of knowledge, skills, and values" (Purves, 1988, p. 1). Some of the recent proposals for the reform of high schools argue for a general education curriculum in which vocational education is an essential component (e.g., Goodlad, 1984). So, in some conceptions of general education, both vocational and academic courses are included.

It is unfortunate that the term "general" is often used at the secondary school level to refer to a track that is neither vocational nor academic (i.e., college preparatory)—a curriculum that reportedly prepares students least well for life after high school. Because the label "general" has become associated with a weak curriculum, it is probably not the best label for an integrated curriculum.

Origins of the Vocational-Academic Split

The vocational-academic split found in today's high schools can be traced to conditions existing toward the end of the nineteenth century. At that time, the public school system was offering a cultural-liberal education while craftspeople were educating craftspeople outside of the school system (Barlow, 1981). As more families, especially working class families, sent their children to school; as social Darwinist views were

adopted and applied to schooling; and as Frederick Taylor's notions of "scientific management" were being used in schools—the curriculum became differentiated. Students' "innate capabilities" and "probable destinies" were assumed and then used to justify tracking students in various programs of study:

> "Educate the individual according to his capabilities" has an innocent and plausible ring; but what this meant in practice was that dubious judgements about the innate capacities of children became the basis for differentiating the curriculum along the lines of probable destination for the child. Dominated by the criterion of social utility, these judgements became self-fulfilling prophecies in the sense that they predetermined which slots in the social order would be filled by which "class of individuals." Just as Taylor decided that "one of the first requirements for a man who is fit to handle pig iron as a regular occupation is that he shall be so stupid and phlegmatic that he more nearly resembles in his mental makeup the ox than any other type," so it was the schools that now were to determine scientifically, of course, what biographical, psychological, or social factors in human beings fit them to be the hewers of wood and the drawers of water in our society. . . . The ramifications of this central production metaphor in educational theory are now widely felt. (Kliebard, 1975, pp. 56-57)

Although some of the earliest proponents of vocational education saw manual training as appropriate for all students and not as an alternative only for those who were not preparing for college, this broader view did not withstand the arguments made by many educational leaders and business people for the narrower view. These people believed that vocational education located within public schools could help train workers for industry, help socialize the poor and immigrants to certain middle-class values and behaviors, make schools more efficient by sorting students according to their probable destinies, and make schools more democratic by providing a curriculum suited to various interests and abilities (Oakes, 1985). Federal legislation that mandated and supported occupationally specific vocational education at the secondary school level (i.e., the Smith-Hughes Act of 1917) expressed a social efficiency philosophy that has perpetuated a differentiated curriculum for high school students.

Some saw this institutionalization of vocational education in the secondary school as signaling the end of the common school:

> The conflicts over vocational education proved to be the last site where a class-based battle was fought over whether the ideal of the common school would be replaced by a highly stratified and differentiated system of public education. (Katznelson & Weir, 1985, p. 151)

We have seen throughout the twentieth century that vocational and academic education have been treated as opposites—serving two different populations despite the fact that some secondary vocational subfields, such as consumer home economics and industrial arts, are general education curricula, not occupationally specific curricula. It can be argued that providing a means for perpetuating the American social class structure is a far more important function of vocational education than teaching the content and skills necessary to prepare students for work, family, or community roles (e.g., Oakes, 1985). If vocational education serves a hidden social agenda, the integration of vocational and academic education will probably not come about easily, despite the success of some isolated experiments.

Concern about the Vocational-Academic Split

Concern about curriculum stratification and differentiation has been voiced by many people (e.g., Apple & Weis, 1983; Giroux, 1988; Oakes, 1985; Shor & Freire, 1987; Weis, 1988). Some of the concern centers around human rights issues: If we have various curriculum strands, which students shall be given access to which strands? Can various curriculum strands be equally beneficial to a variety of students? What happens to students' lives as a result of tracking? A second concern stems from a belief that the economic competitiveness and military security of the country depend on all students' obtaining a "strengthened" education—an education that includes the "basics" of English, mathematics, science, social studies, computer science, and foreign language (National Commission on Excellence in Education, 1983). Some people with this concern go so far as to predict the nation's decline if education fails to produce a better prepared workforce: "Our goods and services will not be competitive, our standard of living will stagnate and eventually, if both come to pass, our influence as a world power will wane" (McLaughlin, 1989, p. A19). And a third concern is that the curriculum is not only differentiated, but it is also fragmented to the extent that many students can, without difficulty, graduate from high school without an education that prepares them well for anything—college, work, or personal life (e.g., Powell, Farrar, & Cohen, 1985).

One Response: Integration of Vocational and Academic Education

Perspectives on how to improve the high school curriculum vary. Although most of the recent reform reports that have received attention call for a common curriculum for all students—a curriculum with relatively few electives and no grouping according to past achievement or presumed ability—there is no agreement on what subjects should be included in a common curriculum. For some, a common curriculum should focus entirely or almost entirely on academic subjects (e.g., Adler, 1982) or liberal education ("Liberal Education Urged," 1988). For others, a common curriculum should include vocational education (e.g., Goodlad, 1984).

Currently, a response to the call for curriculum reform, especially from vocational educators, is one that advocates integration of vocational and academic education. The National Commission on Secondary Vocational Education (1984) has offered six recommendations intended to achieve a more integrated curriculum:

> States should not mandate curricular requirements that restrict students' opportunities to participate in vocational education experiences.
>
> Secondary vocational education courses should provide instruction and practice in the basic skills of reading, writing, arithmetic, speaking, listening, and problem-solving. This addresses the current demand for the new basics without locking all students into the academic classroom.
>
> In addition to developing occupational skills, secondary vocational courses must develop self-esteem, positive attitudes toward work, safe work habits, job-seeking skills, and other general employability skills.
>
> Vocational education courses must be enriched and diversified to make these courses attractive to all students, including the college bound.
>
> Students should be allowed to satisfy some requirements for high school graduation—for example in the areas of mathematics, science, English, or social study—with selected courses in areas of vocational education that are comparable in content coverage and rigor.
>
> State and local educational administrators should provide the opportunity for all vocational students to participate in recognized vocational student organizations. (pp. 25-26)

Given such recommendations, practitioners are left with the task of figuring out how to achieve integration of curricular areas. How can vocational subjects and academic

subjects be brought together in a meaningful way for students? How should content be reorganized if we want students to learn connections between what has been considered vocational and what has been treated as academic?

THEORETICAL APPROACHES TO ACHIEVING INTEGRATION BY REORGANIZING SUBJECT MATTER

Some approaches to integrating curricula retain the autonomy of subject areas; other approaches blur or even erase distinctions among subjects. Tanner and Tanner (1980), along with several other curriculum theorists, discuss three ways to organize a subject curriculum (correlated curriculum, fused curriculum, and broad fields curriculum) and two alternatives to the subject curriculum (core curriculum and activity curriculum).

Correlated Curriculum

A correlated curriculum approach to integration involves developing certain common relations between or among two or more subjects while retaining the usual divisions. For example, an English and a social studies teacher could work together in their planning so that the English teacher would have students write compositions about social problems that are being studied in the social studies class. An example involving vocational education would be an English teacher working with an agriculture teacher to have students write compositions or read literary works that relate to contemporary agriculture problems. The English teacher and the agriculture teacher could correlate their work through (1) a chronological-historical approach, (2) a thematic approach, or (3) a problems approach. Using a chronological-historical approach, the English teacher could have students read Steinbeck's *Grapes of Wrath* while students are studying the chronology of agricultural depressions. Or if the teachers want to organize instruction thematically, the English teacher could have students read E. F. Schumacher's *Small Is Beautiful* when the agriculture teacher is dealing with the concept of sustainable agriculture. A third option, if the teachers wanted to use a problems approach, might focus on a problem such as soil conservation. The English teacher could have students study Wes Jackson's *The Gift of the Good Land* while the agriculture teacher focuses on agriculture policy related to soil conservation.

Except in the rare cases where one teacher is responsible for two or more subject areas which he or she would like to relate, curriculum correlation involves modifying teaching arrangements and planning student schedules so that the collaborating teachers have the same students in their respective classes. If the teachers have the same students but at different times during the day, they could work together to coordinate their curriculum plans and resources. Another teaching arrangement, if the classes meet at the same time, is to have teachers team teach combined classes occasionally or regularly. A third arrangement, also possible if teachers have the same students at the same time, is to have teachers exchange roles and occasionally teach each other's classes. Owens and McClure (1989) refer to these three teaching arrangements as sharing, teaming, and staff crossover, respectively.

Fused Curriculum

The fused curriculum approach to integration involves the merging of related subjects into a new subject. Tanner and Tanner (1980) indicate that fusing curriculum usually occurs within the same subject field. Examples they cite are the creation of (1) earth science courses that fused certain areas of physical science and geography, (2) biophysics courses that merge biology and physics, (3) sociobiology that emerges from sociology and biology, and (4) even biology itself (which was fused at the beginning of the century) from the now separate courses of botany, zoology, anatomy, and physiology. An example of fusing a vocational subject with an academic subject would be to synthesize aspects of home economics with aspects of sociology, psychology, anthropology, and economics to create family social science. Another example is fusing agriculture with economics and creating agricultural economics courses.

Broad Fields Curriculum

The broad fields approach to curriculum integration involves developing some degree of synthesis or unity for an entire branch of knowledge or even for two or more branches of knowledge. Examples of broad field subjects that encompass a single branch of knowledge are social studies, fine arts, physical science, and general science (Tanner & Tanner, 1980). An example of a broad field subject that includes more than one branch of knowledge is a humanities curriculum that ties together literature, history, the visual arts,

architecture, drama, music, mythology, and philosophy. Another example of a synthesis of two or more branches of knowledge is the broad field of ecology, which synthesizes knowledge from biology, physical sciences, social sciences, and agriculture (Tanner & Tanner, 1980). A broad fields approach to integration is more than simply using a label (such as ecology) to refer to a variety of subject areas that are still treated separately: it is a synthesis of related content into an entire program of study.

As it is now, vocational education at the secondary school level is a rubric for a variety of courses but it is not a broad field area of study. If the areas of vocational education that are now treated as discrete areas of knowledge were united into an area of study that focused on understanding their interrelationships, we could create the broad field of vocational education. It seems that this is what Jeannie Oakes (1986) is describing in her proposal for reconstructed vocational education that includes new purposes, organization, curricula, and language. She suggests calling this broad field "technology and economic sciences" or "technological and economic literacy." Oakes' vision of this approach to vocational education would have this newly defined broad field as a required area of study for all students in the comprehensive high school, and it would be taught in heterogeneous classroom groupings. Oakes recommends that a common vocational curriculum be organized around basic concepts of economics and technology and that it include the following four major curricular strands:

> Knowledge of those principles from academic disciplines that underlie economic processes and technology and an understanding of how those principles become transformed into work. This strand would be most like current "academic" classroom learning activities.
>
> Doing economics and technology—concrete hands-on experiences with tools and materials, learning basic economic and technological processes in the classroom—designing, constructing, combining materials and organizing their production, distribution, and consumption. . . . This strand would emphasize processes in their generic or purest forms. They would replace current laboratory or shop activities and include classroom or computerized simulations.
>
> Experiencing how generic principles and processes translate into specific work in the real, complex, and messy world. This strand should emphasize field experiences that provide students with opportunities to see "first-hand" the applications of concepts and learn from the technicians doing this work. These experiences should replace field trips in elementary schools and work-experience for secondary students.
>
> Values and attitudes regarding work and the workplace: e.g., the expectation for a healthy work environment and satisfying work (including

cooperative working relationships); commitment to quality; and social responsibility in the creation and distribution of goods and services. (pp. 68-69)

Core Curriculum

A core curriculum is a replacement of the subject curriculum. Rather than organizing learning around subject matter divisions, this approach to curricular integration organizes knowledge and learning according to the problems and needs of students. "The core curriculum replaces the subject curriculum in general education with the purpose of creating a universe of inquiry, discourse, and understanding among youngsters of different backgrounds and aspirations who, as citizens of a free society, are obliged to share certain common responsibilities and problems" (Tanner & Tanner, 1980, p. 481).

There are two types of core curricula: (1) one where faculty members plan the problem areas and learning activities—the "preplanned core"—and (2) another where the problems and activities are developed jointly by students and teachers—the "open core." Examples of problems that might be investigated in a core curriculum include the population explosion, occupations, the world food supply, technology, racial conflict, and intercultural conflict and understanding. Whatever problems are selected for study, the method of investigation is one of problem solving through reflective thinking among heterogeneous groupings of students. Usually students are scheduled into longer-than-usual blocks of time so that they may pursue fairly extensive investigations and projects.

In the secondary school, a core may exist alongside subjects organized according to traditional disciplines. If the goal is to integrate vocational and academic education, one could have a vocational education core curriculum (focused on problems such as technology, occupations, families) in which students' investigations of the problems require the development of understandings related to mathematics, language, science, and other traditional disciplines.

Activity Curriculum

Like the core curriculum approach, the activity curriculum approach to integration does not recognize traditional subject matter areas. The activity curriculum centers primarily on areas of students' interests. Advocates of the open school or open classroom, such as Kohl (1969) and Holt (1972), argue for school environments that allow students to spontaneously pursue their interests. Examples of adoptions of the activity curriculum can be found at the elementary school level. At a time when high school graduation requirements and college admission requirements are becoming more highly specified, it is unlikely that we could implement an activity curriculum approach at the secondary school level. Exceptions that would allow for creative structuring of schools could occur in states or school districts where graduation requirements are defined by learner outcomes rather than Carnegie units.

ACTUAL APPROACHES TO INTEGRATE VOCATIONAL AND ACADEMIC EDUCATION

Given these theoretical approaches to integrating curricular areas, it is important to determine what is actually occurring with efforts to integrate vocational and academic education. Do the efforts correspond to these models? Which approaches are most frequently used?

To explore these questions, we reviewed the literature to identify reports of the integration of vocational and academic education. (Although our search was directed at publications of the past five years, we did include in our work some earlier citations that we discovered in the course of our review.) Our literature search is summarized in Table 1. (References cited in Table 1 and Table 2 are listed under "References for Tables.")

Explanation of the Literature Review

In Table 1, we categorized integration efforts according to areas we found most frequently reported: four vocational education areas (i.e., agricultural, business, home economics, and industrial) and three academic education areas (i.e., English, science, and

Table 1
Reports of Vocational and Academic Curriculum Integration

Academic / Vocational	English (a) Reading (b) Writing (c) Speaking (d)	Science (a) Physics (b) Chemistry (c) Biology (d)	Mathematics	General
Agricultural	S. Carolina,1986{E}(a) PBThompson,1986{P}(c) Vorst,1989{S}(d)	Briers,1986{S}(a) Louisiana,1986{S,P}(a) Minnesota,1989{E,S} Moss,1987{S}(a) Roegge,1988{S}(d) S. Carolina,1986{E}(a)	Briers,1986{S} Gliem,1987{P} Persinger,1987{S} S. Carolina,1986{E}	Jenkinson,1989{P} Jewel,1989{S} Minnesota,1989{E,S} Nebraska,1988{S} Rohrbach,1986{P} Thompson,1986{P}
Business	Benson,1984{P}(a) Burbach,1987{S}(c,d) McCall,1988{P}(d) Vassallo,1987{S}(d) Wallace,1986{S}(b,c,d)	Holsey,1985{S}(a) Vassallo,1987{S}(a)	Burbach,1987{S} Liebowitz,1988{P} Rosenfeld,1985{S} W. Virginia,1987{S}	Brenneke,1983{S} California,1984{S} Ditzenberger,1987{P} Schoettinger,1985{S}
Home Economics	Carter,1986{S}(c) Ladewig,1987{S}(a,b,c,d) Myers,1984{S}(c)	Ellington,1986{S} Holsey,1985{S}(a) Peterat,1988{S}(d)	Ellington,1986{S} Ladewig,1987{S} Rosenfeld,1985{S} Williams,1988{S}	Kronowitz,1985{E,S} Peterat,1988{S} Reeder,1982{E} U. N.,1984{S}
Industrial	Brown,1987{S}(d) Felice,1987{S}(d) Gudzak,1987{S}(d) N. Carolina,1987{S}(d)	Brown,1987{S}(a) Felice,1987{S}(a) Gudzak,1987{S}(a) Lauda,1985{S}(a) Maley,1984{S}(a) Maley,1985{S}(a) Maley,1988{S}(a) Sawyer,1986{S}(b,c,d) Selby,1988{S}(a) Selland,1986){S}(b) DEThompson,1984{S}	Brown,1987{S} Felice,1987{S} Gudzak,1987{S} Haynie,1989{S} Lauda,1985{S} Maley,1984{S} Maley,1985{S} Maley,1988{S} Oswald,1986{S} Selby,1988{S}	Wiens,1987{P}
Encompassing More Than One Vocational Area	BDavis,1988{S}(b) Foster,1988{S}(b) Hallman,1986{S}(b,c) Harrington,1988{S} Killingsworth,1988{P}(c) Korcheck,1987{S}(a) Losh,1988{S,P}(d) Merkel,1989{S}(b,c) Monmouth,1982{S}(b) Murray,1979{S}(b) Pershing,1988{S}(d) Polto,1988{S}(b) Savage,1979{S}(b) S. Carolina,1987{S}(b) Thornton,1980{S}(b)	Brow,1984{S}(a) Crow,1986{S}(a) Harrington,1988{S} Haywood,1985{S}(a) Losh,1988{S,P}(d) Ouellette,1988{S}(a) Pershing,1988{S}(a) Polto,1988{S}(a) S. Carolina,1987{S}(a) Szaniawski,1978{S}(a)	Brow,1984{S} Corvallis,1986{S} RMDavis,1980{P} BDavis,1988{S} Hallman,1986{S} Harrington,1988{S} Haywood,1985{S} Korcheck,1987{S} Lenderman,1988{P} Long,1980{S} Losh,1988{S,P} Merkel,1989{S} Minneapolis,n.d.{S} Monmouth,1982{S} Ouellette,1988{S} Pershing,1988{S} Polto,1988{S} Shelby,1988{S} S. Carolina,1987{S} Szaniawski,1978{S}	Atkins,1986{S} Colorado,1985{P} Greenfield,1984{P} Jefferson,1983{S} Morgan,1978{P} Ouellette,1988{S} Savage,1979{S} DLThompson,1975{S} Vogler,1987{P}
Other	Abbott,1987{S}(d) Gorman,1987{S}(d) Romano,1987{S}(d) Williams,1986{S}	Abbott,1987{S}(a) Gorman,1987{S}(a) Romano,1987{S}(a) Williams,1986{S}	Abbott,1987{S} Romano,1987{S} Williams,1986{S}	Williams,1986{S}

Note: {E} = PreK-Elementary {S} = Secondary {P} = Postsecondary

mathematics). When more than one vocational area was involved in an integration project, it was categorized as "encompassing more than one vocational area." When the vocational area was one that did not seem to fit into one of the four vocational areas, we categorized it as "other." Examples of these other areas include cosmetology and marine trades. When the academic area being referred to was not specified or was something other than English, science, or mathematics, we categorized it as "general." The categorization of the areas of English and science was further broken down. If an article specified that the integration of English involved reading, writing, or speaking, we noted that in the table. Likewise, if the area of science was specified as physics, chemistry, or biology, we coded it as such. The level of schooling at which integration occurred was coded as prekindergarten through elementary (E), secondary (S), or postsecondary (P). Some of the reports on the integration of vocational and academic education treat computer use as an academic subject. Although such a categorization could be debated, we prepared Table 2 to identify some of the efforts being made to integrate computer use into vocational areas. In most of these cases there was an explicit and concerted effort to help students develop skills for using the computer.

Table 2
Reports of Vocational Areas Integrated with Computer Use

Vocational Area	Computer Use
Agricultural	Newman,1987{S} Ogle,1987{S} Raven,1989{S}
Business	Burbach,1987{S} Miller,1988{S}
Home Economics	Ladewig,1987{S}
Industrial	Koppel,1986-1987{S} Murwin,1988{S}
Encompassing More Than One Vocational Area	Oregon,1984{S} Pershing,1988{S} Pritz,1987{S}

Note: {S} = Secondary

First Level Analysis of Integration Activities

At a glance, it is obvious that there is considerable activity directed toward integrating vocational and academic education—especially when one realizes that only a portion of such activity is reported in the literature and that our search undoubtedly missed some articles. It is also obvious that integration is occurring among all vocational areas and each of the three academic areas of English, science, and mathematics, as well as computer use. Among the vocational areas, it seems that the most activity has occurred in the area of industrial education. Among the academic areas, mathematics and science have been integrated more than English or computer use. Most of the reports we examined referred to integration at the secondary school level, although we did find cases of integration at the elementary and postsecondary levels.

As might be expected, the reports of these integration activities varied in their descriptiveness. Most of the descriptions indicate which subject areas were combined, but they often fail to describe the integration approach, the relative amount of each subject being combined, and the results of integration. Most reports described specific courses; relatively few described integration at the program or school level. Without exception, the reports expressed or implied great hopes for successful outcomes.

Classifying the integration efforts into the theoretical approaches to curriculum integration was difficult. It was difficult to fit examples into the models because actual subject boundaries are not as distinct as the models imply and because the distinctions among the theoretical categories seemed more ambiguous when we examined actual integration practices. Further, in some cases one might even question whether integration was occurring (this, of course, depends on one's definition of integration).

The most frequent type of integration between the vocational and academic areas, as reported in these articles, is the emphasis on basic academic skills in vocational courses. For example, an industrial education teacher is reported to have increased the emphasis of mathematics in her courses. Often the increased emphasis of basic skills in vocational courses is accomplished by vocational teachers working independently to develop new materials and learning experiences for students. Sometimes the emphasis is achieved by having academic teachers work with vocational teachers to enhance the teaching of certain basic academic skills. With a few exceptions, the impression gained from these articles is

that the basic skills being emphasized are fairly elementary skills such as the manipulation of fractions and the construction of sentences.

An emphasis on basic skills in vocational classes might be considered a type of correlated curriculum. However, it is only half of the correlation. Vocational teachers, at least as reported in these articles, are incorporating more academic content; but efforts of their academic colleagues to integrate vocational content into the academic courses are rarely described.

There are some exceptions to this generalization that it is only the vocational teachers who are integrating other content into their courses. Some academic teachers use the "Applied Communications" curriculum developed by the Agency for Instructional Technology and the "Applied Mathematics" curriculum developed by the Center for Occupational Research and Development. The intent of these curricula is to help students learn basic communications and mathematics skills by showing their relevance to vocational situations or applying them to vocational problems. Because these "applied academics" are usually taught by academic teachers without corresponding changes in vocational courses, they provide examples of one-sided correlation—this time, on the academic side.

Another curriculum prepared jointly by the Agency for Instructional Technology and the Center for Occupational Research and Development, "Principles of Technology," appears to be an example of a fused curriculum. The Principles of Technology curriculum incorporates aspects of mathematics and physics with concepts involved in mechanical, fluid, electrical, and thermal systems (concepts usually dealt with in industrial education courses). To the extent that Principles of Technology becomes accepted as a new subject, it represents a fusion of vocational and academic content.

In our review of literature, we found no cases of a core curriculum or an activity curriculum. When we present examples of integration practices later in the text, we will describe what might be considered a case of a broad fields curriculum.

This first level of analysis made us aware of the complexity and diversity of actual integration activities. We realized that it is not enough to classify integration approaches simply by the models from curriculum theory or by subject area. Our first level of analysis led us to formulate four questions as a basis for further analysis: *What* is to be integrated?

How will the integration be accomplished? What is the *scope* of the curriculum integration? And, *why* are people pursuing integration between vocational and academic education? These four questions shaped our second level of analysis of the integration reports.

Second Level Analysis of Integration Activities

Using the four questions listed above, we identified several features of reported integration approaches. These features are displayed in Table 3, "Features of Integration Approaches in Practice." In the following paragraphs, these features will be explained and examples of actual integration projects will be described.

What Content Should Be Integrated?

The issue of what content should be integrated is addressed most often as an issue about *subject matter* (e.g., science and home economics). However, the issue also includes another dimension: the level of *complexity of thought* expected of students.

As mentioned above, the academic subjects most often reported in vocational-academic integration are English, mathematics, and science. Social studies is integrated much less frequently than are the other academic subjects. The academic subjects are being integrated with industrial arts or technology, home economics, agriculture, business, marketing, and health occupations. Art and computer use are reported variably as vocational, academic, or elective subjects.

When we examined integration practices for the level of thinking complexity that educators wanted to develop in students, we found that the content varied from concrete basic skills to high levels of abstraction. We grouped the levels of thinking complexity into three categories: the recall and practice of basic communication and computation skills; the acquisition, use, and transfer of domain knowledge (knowledge of a particular subject area); and the use of critical thinking and judgment.

The approach to integration reported most often involves the teaching—by recall or practice—of basic communication (reading, writing, speaking, listening) and computation skills within vocational courses. Most commonly, this content is presented as supplemental material as remediation, reinforcement, or review prior to applying the skills.

Table 3
Features of Integration Approaches in Practice

Issues	Dimensions	Variations	Examples*				
			A	B	C	D	E
1. Content	Subjects	English	x		x	x	x
		Mathematics	x		x	x	x
		Science			x	x	x
		Social studies		x	x	x	
		Agriculture		x			x
		Business/Marketing					x
		Home economics	x		x		x
		Industrial arts/technology					x
		Health careers				x	
	Complexity of thought	Recall and practice of basic communication & computation skills	x				
		Acquisition, use, & transfer of domain knowledge			x	x	x
		Critical thinking and judgment		x			
2. Method	Content blend	Reinforcement	x	x			
		Correlation					x
		Fusion			x		
		Broad fields				x	
	Teacher arrangement	Individual	x	x	x		
		Collaborative planning				x	
		Collaborative teaching					x
	Program of study	Independent selection	x	x			
		Coordinated program of study			x	x	x
3. Scope	Breadth of exposure	All those in particular courses		x			
		All those in particular programs	x				
		All those in a school			x	x	x
	Exposure time:	A unit (weeks)		x			
		A course (months)	x		x		
		A program (years)				x	x
4. Motivation	Societal needs	Prepare capable workers					
		Achieve social justice					
		Maintain social order					
		Develop citizenship					
	Teacher needs	Experience intellectual stimulation					
		Gain prestige					
		Develop collegial relations					
		Sense job security					
		See students learn					
	Student needs	Meet graduation requirements					
		Mix with more students					
		See relevance and application of learning					
		Acquire job skills					
		Explore careers					
	Administrative needs	Demonstrate school effectiveness					
		Maintain or increase student enrollment					
		Maintain or increase funding					

*These examples are described later in the paper.

Also at this basic knowledge level are examples where vocabulary and basic concepts of one subject are incorporated into another subject. For instance, one report states that integration in a school means the inclusion of "vocational jargon" in academic courses as a way to make those courses more relevant to students' experiences outside of school. In some cases, "technology literacy" and "agriculture literacy" have been presented in academic courses as little more than vocabulary lessons. Similarly, science terminology has been emphasized in some vocational courses and is considered by teachers as a way to integrate academic subject matter into vocational subjects.

At the second level of complexity, domain knowledge is acquired, used, and/or transferred to another content area in order to solve technical problems. For example, physics principles might be applied in an industrial technology course when students are working on solutions to particular problems.

At the most complex level, students use theories and principles from an array of subjects as they engage in critical thinking and judgment to deal with practical problems and social issues. A few reports claim that this type of thinking is what they hope for in combining vocational and academic education, but little has been written about the teaching of critical thinking as part of current integration practices.

In summary, our review of reports of integration shows a large number of efforts at including basic language and mathematics skills in vocational education, with quite a few stressing basic concepts and simple principles of mathematics and science for solving technical problems. Far fewer report the inclusion of complex theory from other disciplines and application of such to difficult societal problems. Although several reports claim that integration will lead to lively class discussion, critical and/or reflective thought, and the preparation of young adults able to cope and flourish in the society of the twenty-first century, there is little evidence in the literature that critical thought applied to moral and ethical issues is a substantial element of integration at this time.

How Will the Integration Be Accomplished?

As we considered the method for accomplishing the integration of vocational and academic education, we identified three aspects of the method: how the content from different areas is brought together, how teachers work together, and how students select

courses. We refer to these dimensions as *content blend, teacher arrangement*, and *program of study*.

As for the first dimension of integration, the five theoretical models of curriculum integration discussed earlier (correlated, fused, broad fields, core, and activity) guided our analysis of how content from different areas is reorganized. Because we did not find examples of a core curriculum or an activity curriculum, we eliminated them from further consideration. We retained the models of *correlation*, *fusion*, and *broad fields* curriculum; and we added another type of integration we will call *reinforcement* (the inclusion of aspects of one subject or skill area in another subject).

Typically, reinforcement is the use of supplemental materials within a class. Reinforcement can be perceived as remediation for, review for, or enrichment of the regular course content. Generally, the extent of the reinforcement is limited and does not become a significant part of the course.

As explained above, correlation refers to the simultaneous effort of teachers to make some of the relations among subjects more explicit and fully elaborated. Fusion refers to the creation of a new subject by reorganizing materials and applications from two or more subjects. Finally, a broad fields curriculum is one in which there is integration of knowledge from within an entire branch of knowledge or across branches of knowledge. Broad fields curriculum integration involves integration of a number of content areas that are related by a common or overarching theme. The integration occurs at the program or school level.

The second dimension of the methods for integrating vocational and academic education is that of teacher arrangement. Reports suggest three types of arrangement: teachers working independently to integrate courses, teachers collaborating on the planning of courses, and teachers collaborating in the teaching of courses.

The simplest and most frequently reported arrangement involves an individual teacher who, with little or no consultation with others, acquires supplementary material to include in her or his course. A second type of arrangement, teachers working together to plan one or more courses, usually takes place when a vocational teacher seeks the help of an academic teacher to plan the reinforcement of selected academic skills and/or concepts in

a vocational course. We did not distinguish between teachers who collaborate at one time to develop a course and teachers who collaborate on an on-going basis throughout the school year. Team teaching, the third type of arrangement, most often occurs when an academic teacher, a resource teacher (such as a reading teacher), and/or a special education teacher becomes involved in the planning and actual teaching of a vocational course. We did not find any reports of staff crossover, an arrangement mentioned by Owens and McClure (1989), in which a vocational teacher and an academic teacher would teach each other's classes on particular days and for specific purposes.

The third dimension of integration is students' programs of study. In some cases, students choose courses with minimal guidance in order to earn the numbers and types of credits needed to meet the school's graduation requirements; they are not committed to a program of study. For these students, integration of content between isolated courses—horizontally and vertically—is their responsibility. Although some students are successful with this approach and benefit from the flexibility it provides in allowing students to pursue their changing interests, for other students the approach is merely one of scattered choices that do not result in depth or coherence in learning.

It appears that schools are increasingly requiring that all students (not just those expected to go to college) plan individualized programs of study as they enter the senior high school. The intent is to encourage students to consider their occupational goals and then to lay out a sequence and combination of courses that will help them achieve those goals. One of the desired results is that students will become more aware of the relevance of schooling to their lives. Another is that teachers will be more aware of the career goals and interests of students and help students by making reference to those interests in the classroom. With this approach, caution must be taken to avoid programs of study that worsen the problems of tracking. Students can be helped to see not that they are locked into a narrow job preparation program, but that the skills and knowledge obtained in their program of study are useful to educational, work, and family experiences after graduation from high school.

What Is the Scope of the Curriculum Integration?

The scope of curriculum integration can be thought of in terms of *breadth of exposure*—that is, the number of students affected by the integration—and *exposure time*—that is, the amount of time during which students have integrated experiences.

The number of students affected by integration efforts can be determined by looking at the level at which the efforts are aimed. Some students are exposed to a single integrated course—most often a course in which the teacher is reinforcing basic communication and/or computation skills. It is only students in the integrated course(s) who benefit from this curriculum integration. Alternatively, integration at the program level involves the coordination of courses and experiences for *all* students within a particular program. Usually there is a program of study—a planned sequence or set of required courses and laboratory work—that attempts to provide a balanced array of selected subject matter content. This entails the vertical arrangement of courses so that over time previous knowledge is built upon as students progress in the program of study. Curriculum integration at the program level is always vertical and sometimes horizontal.

Some schools have tried to integrate vocational and academic education for the entire student body. For example, some schools mandate that all teachers give reading assignments for every class; others require a balance of both vocational and academic courses for graduation; and still others provide staff development and regular planning time for curriculum development or the correlation of courses. Some schools are occupationally focused and are staffed with teachers and counselors who are likely to be aware of the career aspirations of students and inclined to make courses and course selection more relevant to students' interests and plans. The school attempting to do large-scale integration might be relatively free to use less traditional means of organizing content and evaluating achievement (evaluation techniques such as outcome based education and student portfolios).

The length of time students experience an integrated curriculum ranges from weeks (a unit of study) to months (a course of study) to years (a program of study). Examples of each of these will be presented below.

Why Are People Pursuing Integration Between Vocational and Academic Education?

Most reports of integration include discussion about issues of content, method, and/or scope; but few reports devote space to the topic of motivation. What prompts people to integrate vocational and academic education? We present the reasons that were either explicitly stated or strongly implied in some of the reports, and we acknowledge the probability of other motives.

The first set of driving factors behind integration of vocational and academic education deals with *societal needs*—including (1) the need for more capable workers (recommended most commonly to increase international competitiveness), (2) the need for social justice (achieved partially by reducing tracking), (3) the need for social order (expressed in terms of preventing or reducing dropouts and juvenile delinquency by keeping unemployed youth off the streets), and (4) the need for responsible citizens (i.e., people capable of participating in decision making in a democratic society). The first three motives are expressed explicitly; the fourth is usually implied rather than stated.

The second set of motives involves *teachers' needs* related to job security and satisfaction, including (1) the need for intellectual stimulation (the result of dealing with new content, teaching methods, teaching arrangements); (2) the need for prestige (gained from working on a relatively popular and current project); (3) the need for satisfying relations with colleagues (developed during team planning, team teaching, and staff development); (4) the need to sense job security (satisfied by becoming more knowledgeable and flexible and, for some, by maintaining enrollments in their courses); and (5) the need to see students learn (experienced to a greater extent when students perceive relevance in their courses).

A third set of motivations for integrating vocational and academic education involves *students' needs*, including (1) the need to meet graduation requirements via increased course offerings; (2) the need to mix with a heterogeneous group of students; (3) the need to see the relevance of academic content to areas of vocational interest; (4) the need to acquire job skills and knowledge, including the more academic aspects of those skills and knowledge; and (e) the need to freely explore careers without the constraints of a particular job track.

And lastly, *administrative needs* underlie integration activities. It is important for administrators to be able to report data that indicates that their schools are being effective. For example, standardized test scores, graduation rates, percentage of graduates going on for further education, and percentage of students being awarded scholarships affect the public's perception of a school's quality. Most administrators also want to maintain or increase student enrollment either by attracting new students or by minimizing the dropout rate. Moreover, a school's effectiveness and enrollment are directly tied to the funding that

can be obtained for operating it. Therefore, to the extent that curriculum integration helps a school's effectiveness and enrollment data, administrators are likely to be supportive of it.

It is obvious that many beliefs and values are driving the current integration efforts. Some of them are explicit, some implicit, and others (perhaps) are unrecognized. Depending on how these motives are expressed in practice, some are mutually compatible, some incompatible.

Examples of Integration Efforts

In order to further explain integration efforts being reported, we selected five examples that represent various ways in which these features are combined and expressed in practice. These five examples were selected because the reports of them were relatively complete and allowed us to analyze them for a range of features. Table 3 not only lists features of integration but also indicates which features are found in each of the five examples.

Example A

Example A represents a common approach to integration—a teacher working alone to reinforce basic communication and computation skills within one course. Ladewig, Robertson, Boschung, and Strickland (1987) describe a home economics course, "Home and Personal Management," that was created to study the potential of a systematic emphasis on reading, language, and mathematics as a way to increase the basic skills of secondary school home economics students. This was a course developed by University of Alabama faculty who, in order to test the effectiveness of the course, provided twenty-nine teachers with intensive training, computer programs, and supplementary instructional materials to teach the semester course to 399 students. Results of the pretest and posttest for basic skills and other course content indicated that students in the experimental course (i.e., the integrated course that emphasized basic skills and used the computer as a teaching tool) made significantly greater gains in their knowledge of basic skills than did students in the control group. Both groups increased their knowledge of the home economics course content without there being a significant difference between the two increases.

Example B

Example B is an example of a teacher working independently to incorporate a unit of vocational content into an academic course. The cognitive complexity of the unit can range from acquiring or recalling basic communication and computation skills to developing critical thinking skills. The Minnesota Agriculture in the Classroom (M-AITC) program, part of a nationwide educational project, is described in several pamphlets, news releases, and the *Minnesota Guide to Educational Resources about Agriculture: A Compilation of Resources Available to Help K-12 Educators Integrate Agriculture into Major Subject Areas* (1989). The M-AITC program is a public-private partnership serving K-12 education to help increase general "agriculture literacy" among students, educators, resource specialists, and the public. At the high school level, M-AITC units have been added to history, culture, science/environment, economics, and career education curricula.

Example C

Example C is an example of a fused course taught by individual teachers as part of a program of study. Peterat, Casey, McMartin, Mann, Doherty, and Tremblay (1988) report that in New Brunswick, Canada, several schools have moved to a common high school program, eliminating programs that track students. One of the school's compulsory courses, "Life Skills," emphasizes personal management skills and includes the required module, Decision Making and Resource Management. In addition, students must take at least two of the following modules: Law and Everyday Living, Food Choices and Lifestyle, Establishing and Maintaining a Home, Entrepreneurship, and Career Planning and Job Search Techniques. Peterat and her colleagues explain that "home economics uses an interdisciplinary approach and draws on knowledge from a variety of sources in providing practical solutions to the problems of daily living" (p. 61).

Example D

Example D is an example of an occupationally focused school with collaboration among teachers to mutually reinforce vocational and academic curricula. Williams (1986) describes the High School for Health Professionals (HSHP) in Houston. This school, part of the Texas Medical Center, enrolls about seven hundred fifty students interested in pursuing careers in health care. All students participate in health career exploration in grade nine and a two-hour health science program in grades ten through twelve that includes patient care, medical laboratory skills, community health, and a work experience internship:

> A health care perspective is placed on virtually all the lessons HSHP students are taught, both in their vocational classes and in their academic classes. The academic and vocational programs on the campus blend in ways that make both programs more challenging and more meaningful to students. Vocational teachers, all of whom are licensed health care professionals, emphasize the importance of academic skills. The academic teachers constantly show their students the relationship between their subject matter and medicine. When students study the Canterbury Tales, for instance, they learn about the role of medicine in society in the Middle Ages. (p. 39)

Success of the school is attributed to the sense of purpose students share—whether they are planning to be neurologists or nurses' aides—and to the "sense of belonging and future professionalism" instilled by teachers who are proud of their profession. This example goes beyond the reinforcement taking place in individual classrooms. For all students, course content is related to health care throughout the four years of high school. The curriculum in the HSHP could be considered an example of a broad fields curriculum integration where all subjects are united under the concept of health professions.

Example E

Example E is an example of two or more teachers collaborating to correlate vocational and academic courses for all students in particular occupational programs. Harrington (1988) describes the course correlation going on since 1983 at the Great Oaks Joint Vocational School in Ohio. At the school, academic courses are considered "applied academics" because they are developed jointly by vocational and academic teachers and based on job and task analyses and identification of the mathematics, science, and English knowledge and skills required for each occupational area. Teachers collaborate to design strategies and develop projects that integrate vocational topics into academic courses and academic concepts into technical applications. Sometimes teachers arrange their schedules so that they can team teach portions of these courses. This integration approach requires regular and frequent meetings between vocational and academic teachers.

Although more examples could be provided, these five should illustrate the various ways in which dimensions of integration appear in current vocational-academic integration practice.

[Note: As a result of our examination of the literature on curriculum integration, we developed two descriptive models that might be useful to educators as they deliberate and

reflect on their approach to integrating vocational and academic education. These models and brief explanations of them are found in Appendices A and B.]

SOME ISSUES SURROUNDING INTEGRATION EFFORTS

In the process of identifying theoretical models for curricular integration and examining descriptions of what is occurring with the integration of vocational and academic education, we became aware of several issues that need to be acknowledged, studied, and debated. Some of the major issues involve determining what it is that should be integrated, who the integration is intended to benefit, what the desired outcomes are, and how integration efforts should be evaluated.

What Should Be Integrated?

Unless we shift to a core curriculum or an activity curriculum, we will still be considering a content based curriculum organized into subject matter areas. Given such circumstances, the question becomes "What content should be integrated?" Because no discipline stands completely isolated from others, it is conceivable that all subject areas have the potential to be integrated with all other areas. For example, the mathematics teacher could be involved with the curriculum design and instruction of all vocational courses and all other academic courses. In turn, the industrial teacher could play an important role in helping all academic teachers and other vocational teachers to integrate certain concepts and applications into their curricula.

Endless possibilities exist for integrating subjects. This is both exciting and overwhelming to those faced with the task. But what is it we want to integrate? Are there certain subjects that should be given priority? And how extensively should we integrate them? Should integration affect a few courses or the majority of a school's curriculum? What if schools look entirely different from one another because of their reorganization of curricula? Should integrated courses change their names to reflect their content? Can substantive and meaningful integration occur within the current system of Carnegie units? The answers to these questions depend, in part, on the goals decision makers want to accomplish.

Another aspect of the question of what content should be integrated is the issue of "academic" versus "basic." Do we want to make all academic learning more relevant to students? Experiencing the practical application of theoretical knowledge via vocational education would likely contribute to a deeper understanding of and appreciation for the academic material. If this is the purpose, then integration among all vocational and academic subjects would be beneficial.

If, however, the goal of integration is to improve the basic skills of students, then we need to have agreement on the meaning of the term "basic." We would also need to recognize that, most likely, good vocational courses already do require students to draw upon and use their skills in mathematics, science, and language. While some vocational teachers would need to alter their content and teaching a great deal, others might already have the desired integration in their courses.

Also, if the intent is to improve the basic skills of students in vocational classes, we need to clarify the role of the vocational teacher. Is she or he to *teach* the basic skills? To *reinforce* the skills? To *emphasize*? To *remediate*? Or all of the above?

Some integration efforts will involve academic learning in the sense of the broader traditional academic disciplines. Other efforts might be limited to "basic" skills (however those skills get defined). It does not seem necessary or desirable that all integration attempts be of one type, but it is important to clarify what is to integrated.

Perhaps the most basic issue regarding the integration of vocational and academic education is how deep the integration should go. If, as has been argued, the gulf between vocational and academic education is kept wide in order to perpetuate the secondary school tracking system and to separate middle- and upper-middle class students from poor and blue-collar students, then all the attempts in the world to integrate vocational and academic curricula are doomed to oblivion in the long run, if not the short run, as well. But if the current, rather narrow interest in integrating vocational and academic content at the secondary level were used to begin discussions about the deeper meanings of integration in education and in society, some intriguing scenarios featuring vocational and academic education might emerge. This paper will conclude with a brief discussion of three such possible scenarios.

Who Should Benefit from an Integrated Curriculum?

Another issue related to integrating vocational and academic education is deciding which students are intended as the benefactors of an integrated curriculum? Are efforts aimed at all students? Or on "vocational" students? Improving the curriculum experienced by vocational students has benefits, to be sure, but it does not deal with the problem of differentiated curricula for various groups of students.

What Is the Desired Outcome of Integration?

It is obvious in the literature that there is little clarity about just what is to be accomplished by integrating vocational and academic education. Is increased student achievement in basic mathematics and language skills a goal? Is increased ability to apply domain knowledge to problematic situations? Improved grades in certain academic courses? Is the goal to stimulate students' desire to learn in all school areas, to see them stay in school longer, to see greater numbers enroll in and complete postsecondary education? To develop well-rounded, participating citizens? To prepare people who will have technical skills sought by employers? Are students foremost in the plans and practices of integrating curricula? To what extent do efficiency, job security, and competition among schools motivate compromises that shortchange students?

How Should Integration Efforts Be Evaluated?

There are also questions surrounding the integration of vocational and academic education: What approach works best? And what proof is there that integrating vocational and academic education is working?

The literature is not very helpful in answering these questions or in guiding us in the evaluation of integration efforts. Although there is considerable enthusiasm expressed for integration projects, there is insufficient data to claim the success or failure of any type of approach. Lack of clarity about the desired outcomes, difficulty in controlling variables surrounding the integration, and shortcomings of measurement instruments are three of the major hurdles to be overcome in assessing effectiveness of integration approaches. Furthermore, there are differences in opinion about the approach that is most feasible

and/or useful in conducting program evaluations of integration efforts. While some demand experimental designs with nationwide samples and standardized tests, others argue that looking more closely, internally, and qualitatively at selected programs will prove to be the most educative. Most likely, a variety of evaluation approaches will be needed. It also seems helpful to keep in mind that it is unlikely that there is one best approach to curriculum integration and that various approaches will lead to varying results.

Other Issues

Some of the other issues that need exploration will merely be mentioned here. If curricular integration is to work, what changes are needed in preservice and inservice teacher education and counselor education? Should state teacher licensing requirements change to ensure that teachers have the preparation and flexibility to integrate curricula? If students are to experience a greater degree of integration in their learning, do teachers need to change their teaching methods? Does curricular integration require changes in the ways schools are structured? Should high school graduation requirements and college admission requirements be altered so that changes in the high school curriculum are more feasible? These questions need to be addressed as a part of all planning efforts.

GOING DEEPER: THREE SCENARIOS FOR VOCATIONAL AND ACADEMIC INTEGRATION

Thus far in this paper we have presented a conceptual and historical analysis of the current interest in the integration of vocational and academic education, analyzed various theoretical approaches to achieving integration by reorganizing subject matter, reviewed reports of vocational-academic integration in practice, and raised some issues surrounding integration efforts. From these explorations we have concluded that contemporary understandings and practices regarding integration often lack both clarity and bold vision. As currently defined and practiced, integration of vocational and academic education is usually limited to the integration of a narrow range of curriculum content in classrooms structured within traditional school organizational and instructional patterns. Our review of literature on current and recent vocational-academic integration practices yielded no

examples of the activity or core curriculum models; almost all contemporary practice falls within the three narrower curriculum models—correlated, fused, and reinforced.

The potential impact of vocational and academic integration on contemporary research and practice is vastly increased when the vision is deepened and the theoretical models broadened to include broad fields, activity, and core curriculum approaches as well as educational dimensions beyond curriculum. The final section of the paper presents three possible scenarios among many that could be created to illustrate the potential breadth and depth of vocational and academic integration.

The Vocational Roles Scenario

The first and least complex scenario, the vocational roles scenario, is an example of an activity curriculum. In the vocational roles scenario, all students in a given comprehensive high school would relate their studies in all courses to their current and future roles in work, family, and community settings.

Integration of vocational and academic education along these lines would mean that academic education, in particular, would change quite dramatically. As a part of current instructional practice, secondary vocational educators commonly teach students about the workplace. Vocational students are likely to tour workplaces, shadow workers, or have a guided work internship experience. In contrast, academic educators seldom teach about the nature and conditions of workplaces, even in career education courses.

In the vocational roles scenario, vocational students, as well as academic students, would visit places where people actually work—see what those people do and learn to do some of it themselves. High school history students would, for example, go to court with an employee of the state historical society who is trying to prevent a county from destroying a historical landmark. Similarly, English students would attend meetings of product designers, engineers, and technical writers and then write sections of an instruction manual for users of a complex new product.

The emphasis in a comprehensive high school with a vocational roles scenario would be on understanding one's future roles; on applying classroom learning to these

roles; and, finally, on learning some of the skills necessary to function in one's future family and community roles as well as work roles. It should be noted that the emphases on family and especially community roles is somewhat unusual in vocational education. The vocational roles scenario thus has the potential to expand vocational education as well as academic education while increasing integration.

The Vocational Methods Scenario

The second scenario, the vocational methods scenario, would bring into an entire comprehensive high school two key approaches used in vocational education: (1) hands-on experience and (2) meaningful involvement of future employers in planning instructional activities.

This scenario surpasses in complexity any of the curriculum models discussed in this paper. Curriculum models focus on content while the vocational methods scenario focuses on what happens in classrooms—that is, on what happens in both curriculum and instruction.

Probably the strongest potential contribution of vocational education to academic education is the teaching methods used in vocational education. These methods include teaching and learning in cooperative, problem solving peer groups and in "hands on" situations rather than as a purely intellectual exercise.

What would a school which had decided to integrate traditional vocational teaching and learning methods with traditional academic methods look like? It seems clear that the academic approach would be transformed because, while vocational teaching methods include academic methods, the reverse is not usually true.

If academic subjects were taught in cooperative, problem solving peer groups, the content of the academic subjects would change regardless of whether or not specific vocational content were added to the curriculum. A school would have to recast English, mathematics, foreign languages, science, and possibly arts courses into a peer group problem solving format. An advanced French class using traditional academic methods is one in which students study grammar, take dictees, listen to lectures, read French texts,

possibly see French films or listen to French music, and so forth. An advanced French class using a peer group problem solving approach would look quite different because it would involve students using the French language to work on a problem—for example, the impact of immigration on youth employment in France.

A second key approach of vocational education is its use of advisory committees comprised of representatives from an appropriate occupational group. An advisory committee in English, for example, might include representatives from newspapers, TV, radio, advertising, public libraries, and business while an advisory committee in science might include representatives from scientific research laboratories, business and industry, and agriculture. These new advisory committees would discuss what students need to know in academic fields just as vocational advisory committees discuss what students need to know in order to perform well in specific occupations.

The Unabashed Vocational Emphasis Scenario

The third scenario, the unabashed vocational emphasis scenario, would reorganize the entire school structure to prepare students for work, family, and community roles through personalized school environments (this phrase comes from McLaughlin, Talbert, Kahne, & Powell, 1990). This scenario is the most complex because it includes not only the dimensions of curriculum and instruction, but also the additional dimension of school structure.

Vocational educators do not often get the opportunity to make operational the broadest definitions of vocational education—in other words, to develop curricula, instructional methods, appropriate administrative structures, and so forth in creating a school with an unabashed vocational emphasis on preparing students for work, family, and community roles.

Such a school would be free to determine how long different groups of students and teachers should stay together: students and teachers might stay together as long as five years, meaning that curricula would be organized around broad themes, problems, or issues; teachers would do joint rather than individual planning and include student input in such planning; students would work at their own pace and according to their own best

learning styles; subgroups would continually form within the larger group to work on particular problems; visits between the school and other institutions would occur frequently; and people in the school would work on solutions to problems facing people in the broader society as well as in the school.

CONCLUDING COMMENTS

In this paper, we have surveyed and analyzed current efforts at integrating vocational and academic education at the secondary school level. While we found a great deal of activity and interest in curriculum integration, we also found a lack of clarity and precision about the purposes of and procedures for integration. We suggest that the integration of vocational and academic education will require changes in the organization of schools, instructional methods, and curricular approaches.

We hope that this paper can help inform future integration efforts so that vocational-academic integration does not fall by the wayside as yet another unexamined educational panacea. We also hope that readers of this paper will become freshly excited by the promise of vocational-academic integration and diligent about choosing approaches that will best meet the needs of students in their classrooms and schools.

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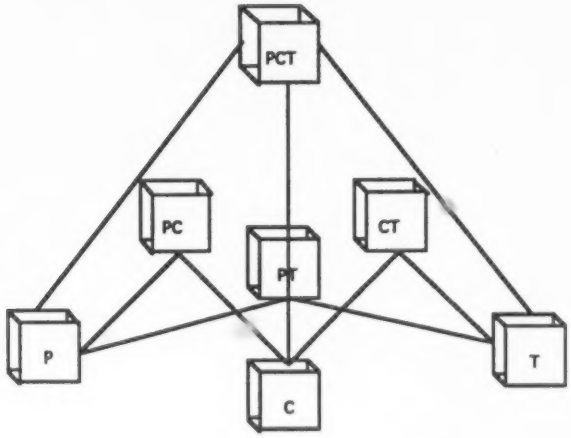
APPENDIX A

MODEL 1
ONE, TWO, AND THREE DIMENSIONAL CHANGES USED TO INTEGRATE CURRICULUM



Explanation of codes:

Program (P) - Students have a coordinated, focused program of study. Course content and teachers remain separated along traditional disciplinary lines.

Courses (C) - Some courses include content from other subjects (reinforced or fused). Students choose courses with minimal guidance (no program of study). Teachers work independently.

Teachers (T) - Academic and vocational teachers are assigned to work together (by either physical proximity or department reorganization). Course content remains separated along traditional lines. Students are not committed to a program of study.

Explanation of Model 1

To develop this model, we selected three variables central to most integration efforts: program of study (P), courses (C), and teachers (T). In the model, each of these variables is of equal value to the others. Although we assume that changing three dimensions is more complicated than changing only one or two, there is no evidence that a three-dimensional change is more effective—in any way—than is a one- or two-dimensional change. It is possible, however, that various combinations have synergistic effects.

Suggestions about Use of Model 1

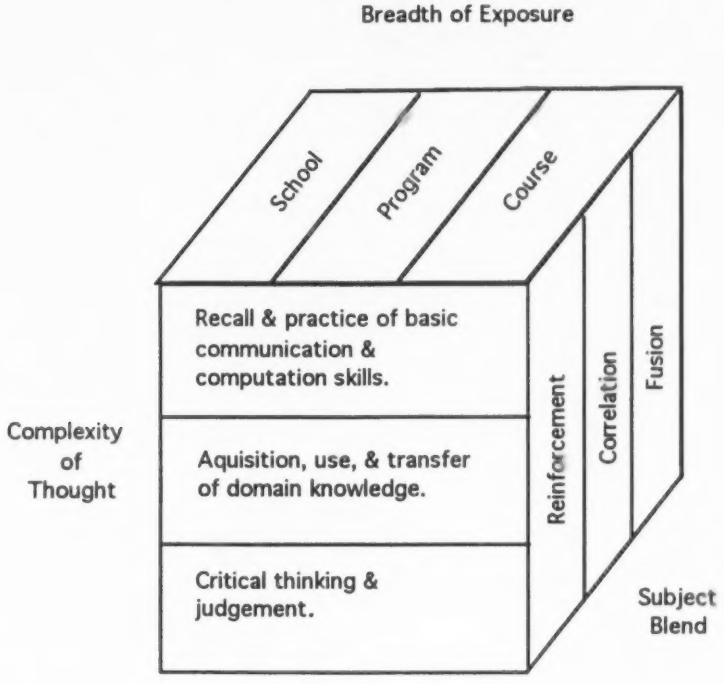
If a change in only one dimension of the curriculum is desired, teachers, counselors, and students could, for example, focus on developing programs of study for students. Or educators could plan to integrate into particular courses some content from one or more subject areas. Another one-dimensional change would encourage collaboration among vocational and academic teachers so that they become more cognizant of each other's subjects and the ways in which they are valuable to students.

Any of these two variables could be combined to create a two-dimensional change to achieve integration. For example, tech-prep programs are examples of changing programs of study and courses. Academies are examples of changing programs of study and teaching arrangements. And team teaching arrangements are examples of changing both courses and teaching assignments.

Some vocational high schools and occupationally focused high schools provide examples of educational practice in which all three variables have been modified from the usual high school structure. In these schools, students have occupational programs of study; courses have been modified from the standard academic-vocational split; and teachers are encouraged or assigned to work together to integrate aspects of students' experiences.

APPENDIX B

MODEL 2
INTEGRATION APPROACHES USING THE DIMENSIONS OF COMPLEXITY OF THOUGHT, BREADTH OF EXPOSURE, AND SUBJECT BLEND



Explanation of Model 2

Perhaps more than anything else, this model illustrates the way in which educational planners could take three dimensions of integration and consider them as combinations. In this version of the model we combine dimensions referring to *what*, *how*, and *who*.

For example, at one end of the continuum, we can plan integration efforts that combine the *recall and practice* of *basic communication and computation skills* in a *nonrequired course* taken by *some students*. At the other end of the continuum of each of these dimensions, we could combine the teaching of *critical thinking and judgment* in a *fused* course that *all students* in a *school* are required to take.